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**PHOSPHATE**

**POTASH**

**THE FERTILIZER SUPPLY  
1970-71**



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# THE FERTILIZER SUPPLY 1970-71 <sup>1/</sup>

## GENERAL SITUATION

Net domestic supplies of fertilizer materials in 1970-71 are expected to total 18 million tons of plant nutrients -- nitrogen (N), phosphate (P<sub>2</sub>O<sub>5</sub>), and potash (K<sub>2</sub>O). This is the largest quantity ever, and is 6 percent more than last year's supply.

Estimated supplies of N will total 8,826,000 tons, up 10 percent from 1969-70; P<sub>2</sub>O<sub>5</sub>, 4,952,000 tons, up 7 percent; and K<sub>2</sub>O, 4,199,000 tons, down about 1 percent from last year.

Inventories of nitrogenous and phosphatic materials in 1969-70 were about the same as in 1968-69, which indicates that they are becoming more stable. Experience will determine if current inventory levels are about the size needed to service customers during a highly seasonal movement of fertilizers. Ammonium sulfate inventories in June 1970 were more than twice what they were in June 1969. These inventories climbed to 482,618 tons in December 1969. The lowest in calendar 1970 was 439,387 tons in December.

Production rates for all nitrogenous materials, except ammonium sulfate, during the first 6 months of the fertilizer year were ahead of last year. Nitrogen solutions and urea were up the most. Ammonium sulfate production was down about 8 percent for the period, yet the quantity available was sizable because of the large inventory at the beginning of the fertilizer year. Production rates for nitrogenous materials are expected to continue at about the same levels during the second half.

Wet-process phosphoric acid production during the first half of the fertilizer year was about 20 percent more than in the same period last year. Ammonium phosphates and concentrated superphosphate were up more than 10 percent and should be up even more during the second half. Normal superphosphate continues to decline in importance. Production during the first 6 months was 20 percent smaller than last year for the same period. Other phosphates were up 34 percent over last year for the first 6 months. This includes the output of a new nitric phosphate plant and possibly some increase in ammonium phosphate-based NPK materials.

About 61 percent of net K<sub>2</sub>O supplies is expected to be imported, primarily from Canada. The Provincial Government of Saskatchewan has established quarterly allocations for producers and minimum prices they can charge. Producers must obtain disposal licenses before they can export potash.

Industry capacity to produce N and P<sub>2</sub>O<sub>5</sub> exceeds the anticipated demand by farmers. Production can be increased significantly if actual demand in excess of anticipated demand can be detected early enough

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<sup>1/</sup> The fertilizer year is from July 1 through June 30.



for industry to increase production schedules. However, the late spring and accompanying slow movement of fertilizers are of deep concern to producers and can cause them to cut back production unless movement starts soon. On the other hand, a sudden opening of the market over a large agricultural area could put extra pressure on plants to meet farmer demand during the rush season. The perennial problem of transportation shortages during the rush season could be magnified by the railroad labor problem if still unresolved.

Total exports of plant nutrients (excluding phosphate rock) are expected to decline 12 percent this year, primarily because of a continued reduction in Agency for International Development (AID) programs. Countries in which AID had active agricultural programs took 53 percent of the plant nutrients exported by the United States in 1969-70. AID countries received 49 percent of the N, 67 percent of the  $P_2O_5$  (excluding phosphate rock), and 53 percent of the  $K_2O$ .

#### NITROGEN (N)

Supplies of N for domestic fertilizer use are expected to total 8,826,000 tons, about 10 percent more than last year (table 1). Domestic production will be up about 5 percent, but increased imports and a continued decline in exports will provide a larger quantity for domestic use.

Supply from domestic production -- Total domestic supply of N for fertilizer use is expected to be 8,941,000 tons. This is domestic production adjusted for inventory changes, plus imports, less exports. Anhydrous ammonia production during the first 6 months of the fertilizer year was up only about 3 percent over the same period last year. However, anhydrous ammonia shipped as such for fertilizer is expected to be about the same as last year. Nitrogen solution supplies will be up more than 20 percent over last year, primarily in nonpressure solutions. Liquid nitrogen supplies from domestic production will be about 68 percent of the total supply from this source.

Solid nitrogen supplies from domestic production will increase about 3 percent over 1969-70. Solid ammonium nitrate will be up about 1 percent. Urea will be up about 14 percent and other solid nitrogen, primarily ammonium phosphates, up 8 percent. Ammonium sulfate is expected to be down about 10 percent.

Imports -- Total nitrogen imports should be about 1,000,000 tons, 18 percent more than last year. Sodium nitrate is the only nitrogenous fertilizer import expected to be smaller than last year. Imports of nitrogen solutions and ammonium sulfate during the first 6 months of the current fertilizer year were more than 70 percent above the same period in 1969-70. Ammonium nitrate, urea, and other nitrogenous materials, mainly ammonium phosphates, are expected to be up nearly 20



Table 1.-- Nitrogen: Estimated supply of N for fertilizer purposes, United States, fertilizer years, 1969-70 and 1970-71

Item	1969-70 <u>1/</u>	1970-71
	<u>1,000</u> <u>Short tons</u>	<u>1,000</u> <u>Short tons</u>
Supply from domestic production:		
Solids:		
Ammonium nitrate <u>2/3/</u> .....	1,133	1,145
Ammonium sulfate <u>3/</u> .....	482	432
Urea.....	535	609
All other solids <u>4/</u> .....	661	715
Total solids.....	2,811	2,901
Liquids:		
Ammonia (including aqua).....	4,147	4,102
All other.....	1,569	1,938
Total liquids.....	5,716	6,040
Total solids and liquids.....	8,527	8,941
Imports:		
Ammonium nitrate.....	103	127
Ammonium sulfate.....	38	66
Urea <u>3/</u> .....	152	179
Sodium nitrate.....	26	18
Ammonia (including aqua).....	391	407
Nitrogen solutions.....	29	55
All other.....	116	154
Total.....	855	1,006
Exports:		
Ammonium nitrate.....	27	19
Ammonium sulfate.....	111	109
Urea.....	309	170
Ammonia (including aqua).....	628	584
All other.....	253	239
Total.....	1,328	1,121
Net domestic supply.....	8,054	8,826

1/ Revised.

2/ Includes ammonium nitrate and ammonium nitrate-limestone mixtures.

3/ Adjusted for estimated quantity going into non-fertilizer uses.

4/ To avoid duplication, the figure for "all other solids" has been adjusted by the estimated amount of imported ammonia used in primary materials.

percent over last year. Anhydrous ammonia imports will be up about 4 percent.

Exports -- Total nitrogen exports are expected to be 1,121,000 tons, 16 percent below last year's quantity. This will be the second consecutive year of decline from the peak reached in 1968-69. The largest reduction will be in urea, down about 45 percent from last year. Ammonium sulfate exports will be down about 2 percent. The decline in urea and ammonium sulfate is a reflection of the decrease in AID requirements. However, tenders for ammonium sulfate outside the AID programs will prevent the decline in ammonium sulfate from being as sharp as the decline in urea. The decline in "all other" nitrogenous materials is being partially offset by newly found customers in Europe.

Nitrogen capacities -- Anhydrous ammonia capacity is estimated to be 16.5 million tons of  $\text{NH}_3$  January 1, 1971, in 88 operating plants. Four plants were shut down during calendar 1970 and one was put on standby. This reduced capacity by 479,000 tons. Plans were shelved for two new plants which had been announced. Three new plants, totaling 924,000 tons of capacity, are expected to start production during 1971. They will add only 508,000 additional tons to capacity because they are replacements for existing plants.

Current urea capacity for producing urea for all uses is estimated to be 4.4 million tons of material. Ammonium nitrate capacity for production of fertilizer is about 6.6 million tons of material, of which about 57 percent is solid and 43 percent liquid. In addition, about 1.4 million tons of capacity is available for industrial use.

Ammonium sulfate capacity is estimated to be 2.9 million tons of material. About 37 percent of this capacity is synthetic, 36 percent chemical byproduct, and 27 percent coke-oven. Synthetic capacity is declining and chemical byproduct is increasing.

#### PHOSPHATE ( $\text{P}_2\text{O}_5$ )

Supplies of  $\text{P}_2\text{O}_5$  will total 4,952,000 tons, about 7 percent more than in 1969-70 (table 2). Imports will be up 17 percent and exports up 1 percent.

Normal superphosphate -- Total supplies of normal and enriched superphosphate from domestic production will be 581,000 tons of  $\text{P}_2\text{O}_5$ , 24 percent less than last year. Imports will be negligible. Exports are expected to total about 9,000 tons of  $\text{P}_2\text{O}_5$ , up about 2,000 tons over last year.

Concentrated superphosphate -- Total supplies of concentrated superphosphate from domestic sources are expected to be 1,316,000 tons of

Table 2.-- Phosphate: Estimated supply of  $P_2O_5$  for fertilizer purposes, United States, fertilizer years, 1969-70 and 1970-71

Item	1969-70 <u>1/</u>	1970-71
	<u>1,000</u> <u>Short tons</u>	<u>1,000</u> <u>Short tons</u>
Supply from domestic production:		
Normal and enriched superphosphate..	769	581
Concentrated superphosphate.....	1,332	1,316
Ammonium phosphate <u>2/</u> .....	1,950	2,026
All other <u>3/</u> .....	1,147	1,565
Total.....	5,198	5,488
Imports:		
Concentrated superphosphate.....	53	17
Ammonium phosphate.....	170	245
All other.....	50	57
Total.....	273	319
Exports:		
Normal superphosphate.....	7	9
Concentrated superphosphate.....	327	324
Ammonium phosphate.....	441	472
All other.....	70	50
Total.....	845	855
Net domestic supply.....	4,626	4,952

1/ Revised.

2/ Liquid and solid ammonium phosphates excluding those combined with potash salts in the process of manufacture.

3/ Includes nitric phosphates, sodium phosphate, wet base goods, natural organics, phosphate rock, colloidal phosphate, basic slag, estimates of wet and furnace phosphoric acid for liquid and solid mixed fertilizers and direct application, and ammonium phosphates combined with potash salts in process of manufacture.



P<sub>2</sub>O<sub>5</sub>, about the same as last year. Imports are expected to be about one-third the quantity imported in 1969-70. Mexico's entry into the U. S. market seems to have stopped about as abruptly as it started in 1969-70. Exports will be about the same as last year.

Ammonium phosphates -- Domestic supplies of ammonium phosphates are expected to be about 4 percent larger than in 1969-70. Imports will be up about 44 percent, primarily from Canada. Exports are expected to be up about 7 percent. This is another product for which customers in Europe seem to have offset the decline in AID requirements.

Phosphoric acid -- Wet-process phosphoric acid supplies from domestic sources for fertilizer use are expected to be about 20 percent larger than last year. The quantity of acid needed to manufacture concentrated superphosphate and ammonium phosphates will be up about 4 percent. The remaining increase in the quantity of acid will go into ammoniator-granulators for manufacture of solid mixtures and solid N-P base materials, liquid N-P base materials, liquid mixed fertilizers, and for direct application.

Direct application of ammonium phosphates -- Direct application of selected ammonium phosphate grades totaled 2,657,893 tons of material in 1968-69, latest year for which data are available (table 3). Consumption of 18-46-0 accounted for 56 percent of the selected ammonium phosphate grades used for direct application in 1968-69, up 20 percent from the previous year. Only 644 tons of this material was used in 1959. Noticeable gains continued in the use of 10-34-0, which is an ammonium polyphosphate made from wet-process based superphosphoric acid and anhydrous ammonia. The 11-37-0 is made from furnace acid based superphosphoric acid and anhydrous ammonia. The quantity of this material seems to have peaked in 1967-68.

The quantity of the selected grades of materials increased 64 percent from 1964-65 to 1968-69 while the P<sub>2</sub>O<sub>5</sub> content increased 90 percent and the nitrogen content increased 66 percent.

The term ammonium phosphates, as used in this report, includes a group of N-P materials -- monammonium and diammonium phosphates, mixtures of the two, or combinations with ammonium nitrate and ammonium sulfate plus ammonium polyphosphates.

Table 3 does not include all grades of ammonium phosphates. It does include some tonnage in the N-P grades which can be produced by mixing N and P<sub>2</sub>O<sub>5</sub> source materials other than anhydrous ammonia and phosphoric acid or by other chemical processes. The 16-20-0 is an example of a material which is not necessarily an ammonium phosphate.

Phosphate capacities -- Normal superphosphate capacity in operating plants is estimated to be about 1.3 million tons of P<sub>2</sub>O<sub>5</sub>. Production

Table 3.--Ammonium phosphates: Consumption of selected grades for direct application, United States, fertilizer years, 1964-65 through 1968-69 1/

Grade	1964-65	1965-66	1966-67	1967-68	1968-69
10-34-0.....	44,670	52,020	91,594	138,035	189,341
11-37-0.....	15,277	34,391	42,102	50,218	44,925
11-48-0.....	157,719	185,225	199,238	205,151	156,937
13-39-0.....	14,074	10,578	7,853	15,342	30,343
16-20-0.....	493,926	517,989	500,108	492,368	516,621
16-48-0.....	145,890	115,999	70,868	72,109	79,580
18-46-0.....	504,481	786,782	906,372	1,246,953	1,490,409
21-53-0.....	29,135	34,787	30,602	33,013	26,382
23-23-0.....	21,443	23,673	39,074	39,774	25,310
27-14-0.....	21,584	31,225	36,423	28,154	21,270
28-14-0.....	.....	8,998	12,508	35,796	20,704
29-14-0.....	55,519	63,218	52,869	41,215	18,571
30-10-0.....	61,377	62,334	64,609	58,308	37,500
Total.....	1,565,095	1,927,219	2,051,220	2,456,436	2,657,893
N content <u>2/</u>	269,895	334,525	354,285	421,806	448,286
P <sub>2</sub> O <sub>5</sub> content <u>2/</u>	540,213	689,283	741,755	923,851	1,027,303

1/ Excludes Alaska, Hawaii and Puerto Rico

2/ N and P<sub>2</sub>O<sub>5</sub> contents calculated.

Source: Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, Statistical Reporting Service, U. S. Department of Agriculture.

during the first 6 months of the year indicates that the plants were operating at about 45 percent of capacity. Some plants are operated only intermittently.

Concentrated superphosphate capacity is estimated to be 2.0 million tons of  $P_2O_5$ .

Ammonium phosphate capacity in operating plants is about 3.1 million tons of  $P_2O_5$ . There are other plants which manufacture ammonium phosphate for captive use in mixed fertilizers, but sufficient information is not available for making a reliable estimate of their capacity.

Wet-process phosphoric acid capacity in operating plants is estimated to be 5.5 million tons of  $P_2O_5$ . Some of these plants are multitrain, but all trains are not in operation all the time.

The above estimates of  $P_2O_5$  capacity are based on current production of the various phosphatic materials. However, these capacities may shift within limits from one material to another, since phosphoric acid is the basic  $P_2O_5$  source for the production of all concentrated phosphatic materials except nitric phosphate. Market conditions govern the division of the output into concentrated superphosphate, various grades of ammonium phosphate, liquid base N-P materials, or phosphoric acid. The recently constructed modern complexes are capable of quickly shifting production within limits to whatever type of phosphatic material is in demand.

#### POTASH ( $K_2O$ )

Net domestic supplies of potash in 1970-71 are expected to be 4,199,000 tons of  $K_2O$ , about 1 percent less than last year (table 4). Supplies from domestic sources will be about the same as in 1969-70. Imports are expected to move down about 6 percent and exports about 20 percent.

Potassium chloride -- Supplies of domestically produced potassium chloride (muriate of potash) are expected to be about the same as in 1969-70, totaling 1,929,000 tons of  $K_2O$  (table 4). Imports will be down about 6 percent, totaling slightly less than 2.5 million tons of  $K_2O$ . Exports are also expected to be down about 20 percent.

Potassium sulfates -- Domestic supplies of potassium sulfate and potassium magnesium sulfate are expected to total 226,000 tons of  $K_2O$ , about 11 percent less than in 1969-70. Imports will be up about 17 percent. Exports will be down about 20 percent.

Potash capacities -- U. S. potash production capacity is estimated to be 3.3 million tons of  $K_2O$  as of January 1, 1971 according to the latest estimates from the Bureau of Mines. One plant recently stopped production to make changes in operations but is expected to be producing



Table 4.-- Potash: Estimated supply of K<sub>2</sub>O for fertilizer purposes, United States, fertilizer years, 1969-70 and 1970-71

Item	1969-70 <u>1/</u>	1970-71
	1,000 <u>Short tons</u>	1,000 <u>Short tons</u>
Supply from domestic production:		
Potassium chloride.....	1,927	1,929
Potassium sulfate <u>2/</u> .....	253	226
All other.....	35	35
Total.....	2,215	2,190
Imports:		
Potassium chloride.....	2,627	2,469
Potassium sulfate <u>2/</u> .....	35	41
All other.....	29	37
Total.....	2,691	2,547
Exports:		
Potassium chloride.....	541	433
Potassium sulfate <u>2/</u> .....	93	73
All other.....	38	32
Total.....	672	538
Net domestic supply.....	4,234	4,199

1/ Revised.

2/ Includes potassium-magnesium sulfate.

again before the end of the year. A new plant was formally dedicated toward the end of 1970.

Canadian capacity is estimated to be about 7.6 million tons of  $K_2O$ , based on published reports and not counting the closed mine. This involves 8 producers. One mine was closed during the past year because of water problems. A new mine started production the last half of 1970.

#### INVENTORIES

Nitrogen -- The inventory of anhydrous ammonia last June was up slightly compared with the previous June (table 5). But even then, it was only about two-thirds as large as it had been at the same time in 1968. Stocks of solid ammonium nitrate last June were down to less than one-half of what they had been in June 1968, and were the lowest for that month since June 1966. Inventories for December and February are shown in the table to reflect the increase in stocks to meet the peak spring demand. Stocks of synthetic and chemical by-product ammonium sulfate peaked at a record level of 547,160 tons in February 1970. The June inventory was also a record quantity for that month even though it was smaller than in February.

Phosphate -- The wet-process phosphoric acid inventory last June was about the same as a year ago. However, monthly inventories the first half of calendar 1970 were below those of the corresponding months in 1969 except February. During the last half of the calendar year, they exceeded those of the corresponding months in 1969. Normal and enriched superphosphate inventories exceeded 100,000 tons of  $P_2O_5$  only in January and February of calendar 1970. Concentrated superphosphate stocks in June 1970 were nearly one-half of what they had been in June 1968, and were the lowest for that month since 1966. However, they were larger in each of the first 6 months of the current fertilizer year than for the same month in the previous year. The ammonium phosphate inventory in each month of 1970 except January was lower than for the same month in 1969.

#### FOREIGN TRADE IN FERTILIZER

U. S. Imports -- Canada is the major source of U. S. fertilizer imports (table 6). U. S. companies or their subsidiaries in Canada, and subsidiaries of Canadian companies in the United States are responsible for a large share of the imports. The only important imported fertilizer materials for which Canada is not the primary source are calcium nitrate, anhydrous ammonia, potassium sulfate, potassium sodium nitrate, and sodium nitrate. Mexico was the major source of concentrated superphosphate in 1969-70 for the first time but monthly shipments have not continued at last year's level during the first 5 months of 1970-71.

Table 5.-- Inventories of selected fertilizer materials, United States, end of December, February and June, 1968-70 1/

Material	Unit	December			February			June		
		1968	1969	1970	1968	1969	1970	1968	1969	1970
Anhydrous ammonia.....	Tons of material	1,453,117	1,323,115	1,371,314	1,963,404	1,656,583	1,526,152	939,899	580,542	614,098
Ammonium nitrate, solid.....	"	272,344	308,917	277,629	333,486	370,757	285,668	138,781	76,988	51,883
Ammonium sulfate.....	"	300,583	482,618	439,387	354,993	387,138	547,160	265,404	210,882	486,642
Ammonium sulfate coke oven.....	"	138,000	178,000	163,000	156,000	108,000	194,000	104,000	107,000	104,000
Nitrogen solutions....	Tons of N	308,350	200,471	332,753	339,957	334,392	235,361	168,392	42,857	78,506
Phosphoric acid wet process.....	Tons of P <sub>2</sub> O <sub>5</sub>	109,794	98,870	115,940	99,351	84,112	96,906	98,152	89,608	88,277
Total phosphates.....	"	534,983	453,570	473,868	703,860	589,966	422,320	529,279	410,683	350,940
Normal & enriched Superphosphates....	"	141,233	106,520	92,433	182,133	153,007	102,369	125,039	100,154	80,129
Concentrated super-phosphates.....	"	180,790	148,474	168,700	276,954	187,396	135,349	215,206	151,098	137,154
Ammonium phosphates...	"	190,826	181,772	176,426	215,505	225,842	167,824	170,246	141,311	117,744
Other phosphates.....	"	22,134	16,804	36,309	29,268	23,721	16,778	18,788	18,120	15,913

1/ Reported by primary producers.

Table 6.--U. S. imports of selected fertilizer materials by country of origin, fertilizer year 1969-70 1/

Country of origin	Ammonium sulfate		Ammonium nitrate		Calcium nitrate		Urea		Anhydrous ammonia		Phosphate Crude		Potassium chloride		Potassium sulfate		Potassium nitrate		Mixed fertilizers
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	
Canada	155,688	296,537	114	170,437	182,741	4,319	4,300,133									32		166,365	
Mexico	3,631	100		1,939		24,422													
Cuba				63,099	272,013														
Neth Antilles		8,743		8,397	17,389	122,309													
Chile																			
Argentina			573																
Norway		520	46,643	37,720												400		1,700	
United Kingdom				56						100								2	
Netherlands	12,315			82,453	5,020	2,576													
Belgium			20	39,691															
France																			
West Germany	7,716	110	1,397	6															
Spain																			
Italy				14,143															
Israel																			
Japan				5,636															
Australia					26														
Togo																			
Total.....	179,350	306,010	48,747	423,577	477,189	153,626	4,377,755									69,717	39,094		168,668

1/ Other materials imported mainly from Canada were the following: 10,862 tons calcium cyanamide, 97,651 tons nitrogen solutions, 395,476 tons ammonium phosphates, 19,966 tons liquid phosphatic fertilizers, and 32,216 tons solid phosphatic fertilizers; also 164,130 tons of sodium nitrate from Chile and 85,517 tons concentrated superphosphate from Mexico. Other products were 5,471 tons potassium nitrate 62 tons ammonium nitrate limestone, 13,112 tons nitrogenous fertilizers, and 22,831 tons of fertilizer materials.



Imports of ammonium nitrate, urea, nitrogen solutions, ammonium phosphate, and potassium chloride showed marked increases in 1969-70 over 1968-69 (table 7). Canada contributed most of the increase in each material. The fertilizer market there turned down, about the time a number of new Canadian fertilizer plants were starting to produce. Special effort was exerted to move the fertilizers into the U. S. market.

Potassium chloride imports from Canada totaled 4.4 million tons of material in 1969-70, 1.2 million tons more than in the previous year.

U. S. Exports -- Phosphate rock exports continued to total more than that of all other fertilizer exports combined (table 8). Canada and Japan took over 2 million tons. Italy and West Germany each took over 1.3 million tons. Mexico took nearly 1 million tons, up 67 percent from the previous year. This reflects the added requirements for its new phosphatic fertilizer plant. Total exports of potassium chloride, ammonium phosphates, anhydrous ammonia, concentrated superphosphate, urea, and ammonium sulfate ranged from slightly over one-half million to nearly 1 million tons. About 83 percent of the anhydrous ammonia exports went to Europe. Japan was the most important single market for potassium chloride.

About 53 percent of all plant nutrients exported (excluding phosphate rock) went to countries with AID agricultural programs. Over 85 percent of the ammonium sulfate, urea, and mixed fertilizers went to these countries (table 8). They also took over 60 percent of the ammonium nitrate, concentrated superphosphate, and ammonium phosphate. The AID countries received 49 percent of the N, 67 percent of the  $P_2O_5$  (excluding phosphate rock), and 44 percent of the  $K_2O$  exported by the United States in 1969-70.

Urea, ammonium phosphate, and mixed fertilizer exports were the only gains in 1969-70 over the previous year (table 9). Shipments to India, Pakistan, and Indonesia were responsible for 96 percent of the record quantity of urea, and all other AID countries for only 1 percent. AID countries received 62 percent of the ammonium phosphate. European countries received 25 percent. AID countries received 86 percent of the mixed fertilizers with South Vietnam alone receiving nearly one-half of them.

U. S. historical trade balance -- The United States had always been a net importer of nitrogen (N) until 1966 except for the 3 year period 1947-49 (table 10). The export balance in 1947-49 resulted from exports in the "Food for Peace Program" following World War II. The net export balance beginning in 1965-66 resulted from the increased emphasis on the use of fertilizers in the AID programs. A reduction in AID requirements in 1969-70 caused the first decline in N exports since 1962-63. AID requirements for 1970-71 are expected to be even less than in 1969-70 which could make exports about equal to imports.

Table 7.--- U. S. imports of selected fertilizer materials, fertilizer years 1965-66 through 1969-70

Material	1965-66	1966-67	1967-68	1968-69	1969-70
-----Short tons of material-----					
Anhydrous ammonia.....	258,179	392,502	420,125	425,103	477,189
Ammonium nitrate.....	178,435	174,274	219,529	234,528	306,010
Ammonium nitrate-limestone.....	1,580	1,480	6,849	1,265	62
Ammonium sulfate.....	153,324	170,581	143,155	134,979	179,350
Sodium nitrate.....	363,273	270,783	195,495	159,875	164,130
Calcium nitrate.....	31,805	48,832	32,629	50,884	48,747
Urea.....	201,611	275,157	241,154	251,057	423,577
Calcium cyanamide.....	18,839	19,749	16,979	15,152	10,862
Nitrogen solutions.....	80,358	82,472	69,742	80,841	97,651
Synthetic nitrogenous material....	22,699	21,445	15,944	15,818	13,112
Phosphate, crude.....	149,472	168,801	127,650	114,019	153,626
Ammonium phosphate.....	182,170	193,984	224,497	277,072	395,476
Potassium chloride.....	2,142,266	2,578,189	3,608,238	3,175,006	4,377,755
Potassium sulfate.....	52,918	60,716	49,444	40,134	69,717
Potassium-sodium nitrate.....	23,250	50,603	28,959	32,821	39,094
Mixed fertilizers.....	186,240	175,133	178,738	161,080	168,668



Table 8.-- U. S. exports of selected fertilizer materials by country of destination, fertilizer year 1969-70 1/

Country of destination	Ammonium sulfate	Anhydrous ammonia	Ammonium nitrate	Urea	Phosphate rock (all)	Normal super-phosphate	Concentrated super-phosphate	Potassium chloride	Ammonium phosphate	Mixed fertilizers
Short tons										
Canada.....	18,655	356	262	777	2,004,664	2,666	23,681	454	54,703	27,908
Mexico.....	486	23,366	3,245	12,417	932,963	166	12,871	43,101	22,729	3,752
Guatemala 2/.....	16	---	65	---	---	---	---	36	12,520	2,004
El Salvador 2/.....	16,177	---	20	35	21,156	---	399	3,816	21,728	9,987
Costa Rica 2/.....	1,266	1,996	4,077	---	1,384	521	5,726	14,451	8,939	150
Bahamas (British).....	2,860	9	887	104	94	475	20	---	159	10,025
Jamaica 2/.....	3,381	16	1,024	---	28	---	3,053	14,088	4,787	322
Dominican Republic 2/.....	28,727	17	336	---	161	134	4,485	5,555	11,490	875
Trinidad and Tobago.....	---	16,976	---	---	---	---	251	---	405	8
North America, Other 2/.....	2,228	123	174	1,798	29	1,987	243	1,533	5,438	12,537
Colombia 2/.....	3,568	---	14	---	19,514	13	33,604	20,844	17,564	1,543
Venezuela 2/.....	6,282	---	3,669	32	1,632	---	3,134	14,281	1,425	13
Peru 2/.....	11,087	---	17,196	---	14,606	---	66	2,481	4,693	146
Chile 2/.....	10	63	5,122	---	---	---	163,951	13,207	19,571	---
Brazil 2/.....	91,426	13,905	1,826	69	372,370	---	177,940	172,848	239,242	5,944
Uruguay 2/.....	7,765	---	10	---	13,734	---	---	---	4,143	32
Argentina 2/.....	---	---	6	---	---	---	9,208	3,086	21,325	468
South America, Other 2/.....	---	58	652	3,067	4,663	504	7,133	3,508	8,063	3,042
Sweden.....	---	---	---	---	194	---	---	13,353	---	1
Norway.....	---	59,035	---	---	107,520	---	---	---	---	5
Finland.....	---	60,632	---	---	---	---	---	---	---	---
Denmark.....	---	76,427	---	---	24	---	6,604	---	2,201	---
United Kingdom.....	---	143,784	---	---	69,689	---	---	569	2,931	53
Netherlands.....	---	82,690	14	191	408,204	---	37,484	12,322	28,681	16
Belgium and Luxembourg.....	---	137,373	---	---	395,181	---	1,543	72	19,263	3
France.....	---	---	---	3,850	327,450	---	2,425	---	23,587	14
West Germany.....	---	---	107	12	1,355,320	---	8,777	---	516	2,359
Austria.....	---	---	---	---	99,428	---	---	---	---	---
Poland and Danzig.....	---	7,559	---	---	---	---	52,150	---	---	---
Spain.....	12	63,540	---	200	235,801	---	3,307	---	69,412	225
Italy.....	5,875	---	6	314	1,305,543	---	13,872	---	48,279	4
Yugoslavia.....	---	9	---	---	---	---	10,648	---	63,752	---
Turkey 2/.....	---	---	---	49	7	---	15,792	---	3,472	---
Europe, Other.....	91	---	---	187	922	14	---	---	---	541
Iran 2/.....	---	16,180	---	---	33,331	---	374	---	18,021	2,205
India 2/.....	281,827	---	25,607	227,306	364,440	---	---	---	101,102	75,217
Pakistan 2/.....	---	36	---	358,292	---	---	38,684	---	35,871	5,000
Ceylon 2/.....	34,369	---	---	---	---	---	---	---	---	9
Thailand 2/.....	---	17	260	---	6	---	13	72	13,234	2,671
South Vietnam 2/.....	12,134	---	---	---	---	---	16,994	12,125	42,860	191,346
Indonesia 2/.....	---	---	---	61,664	---	---	25,496	3,024	130	33,220
Philippines 2/.....	14	8,188	---	---	148,334	---	---	25,759	2,756	18
Korea, Rep. of 2/.....	7	---	---	---	609,324	---	---	14,336	8,566	3
Taiwan 2/.....	---	---	---	---	70,562	---	---	45,363	---	---
Japan.....	---	10,764	13,982	---	2,014,913	29,740	30,533	281,803	27,463	128
Asia, Other 2/.....	25	2,197	---	400	8	---	---	---	555	34
Australia.....	5	10,746	2,622	---	20,699	---	---	87,929	8,232	76
New Zealand and Western Samoa	60	---	---	---	13,443	---	---	92,379	5,303	11,858
Oceania, Other.....	---	---	28	---	---	---	---	---	---	109
Algeria 2/.....	---	26,963	---	---	---	---	---	---	---	---
Africa, Other 2/.....	91	1,624	---	77	5,627	139	---	13	940	110
Total.....	528,444	764,649	81,211	670,841	10,972,968	36,359	710,461	902,408	986,051	403,981
Amount to AID countries.....	500,400	71,383	60,058	652,789	1,680,916	3,298	506,295	370,426	608,435	346,896
Percent to AID countries....	95	9	74	97	15	9	71	41	62	86

1/ Other exports: 585 tons sodium nitrate; 32,482 tons nitrogenous fertilizers, n.e.c.; 186,138 tons potassium chemical fertilizers, n.e.c.; and 50,314 tons organic materials.

2/ Countries with active AID programs, all quantities not necessarily financed by AID.

Table 9.-- U. S. exports of selected fertilizer materials, fertilizer years 1965-66 through 1969-70

Material	1965-66	1966-67	1967-68	1968-69	1969-70
-----Short tons of material-----					
Anhydrous ammonia.....	131,486	258,224	465,913	997,874	764,649
Ammonium nitrate.....	85,258	74,928	49,020	110,147	81,211
Ammonium sulfate.....	1,412,074	1,290,944	1,226,520	1,185,431	528,444
Sodium nitrate.....	670	468	282	1,416	585
Urea.....	38,313	68,028	149,080	565,068	670,841
Synthetic nitrogenous materials n. e. c.....	24,552	22,723	26,108	22,971	32,482
Phosphate rock.....	8,288,754	10,128,028	10,646,019	12,386,894	10,972,968
Normal superphosphate.....	85,111	89,015	102,681	37,396	36,359
Concentrated superphosphate.....	563,032	663,801	869,792	1,089,075	710,461
Ammonium phosphate.....	461,520	955,289	1,516,558	970,316	986,051
Potassium chloride.....	955,272	968,009	1,009,501	1,057,432	902,408
Potassium sulfate.....	158,747	142,435	151,698	232,511	186,138
Mixed fertilizers.....	107,159	186,915	235,455	268,912	403,981

Table 10.-- U. S. imports and exports of primary plant nutrients, 1940 through 1970-71

Year	N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O	
	Imports	Exports	Imports	Exports	Imports	Exports
	-----1,000 tons-----					
Calendar year	:	:	:	:	:	:
1940	: 189	: 57	: 44	: 45	: 115	: 63
1941	: 165	: 35	: 63	: 52	: 13	: 57
1942	: 189	: 16	: 35	: 60	: 3	: 49
1943	: 208	: 28	: 36	: 92	: 17	: 70
1944	: 215	: 12	: 55	: 60	: 4	: 69
1945	: 254	: 28	: 33	: 64	: 4	: 68
1946	: 203	: 86	: 34	: 87	: 3	: 66
1947	: 203	: 258	: 38	: 93	: 25	: 68
1948	: 224	: 270	: 38	: 117	: 26	: 70
1949	: 233	: 320	: 45	: 137	: 18	: 70
1950	: 262	: 236	: 38	: 112	: 194	: 65
1951	: 338	: 72	: 56	: 168	: 308	: 69
Fertilizer year:	:	:	:	:	:	:
1951-52	: 290	: 73	: 39	: 94	: 264	: 63
1952-53	: 429	: 44	: 41	: 74	: 159	: 54
1953-54	: 421	: 62	: 62	: 88	: 121	: 54
1954-55	: 373	: 141	: 61	: 154	: 139	: 91
1955-56	: 330	: 255	: 56	: 153	: 170	: 180
1956-57	: 294	: 268	: 54	: 256	: 179	: 315
1957-58	: 305	: 227	: 59	: 246	: 213	: 252
1958-59	: 294	: 223	: 64	: 204	: 238	: 310
1959-60	: 298	: 188	: 82	: 177	: 282	: 418
1960-61	: 276	: 213	: 67	: 238	: 285	: 484
1961-62	: 337	: 234	: 87	: 283	: 282	: 503
1962-63	: 344	: 196	: 117	: 275	: 486	: 411
1963-64	: 453	: 264	: 100	: 400	: 691	: 526
1964-65	: 470	: 392	: 98	: 432	: 884	: 625
1965-66	: 529	: 546	: 125	: 441	: 1,332	: 664
1966-67	: 669	: 749	: 165	: 787	: 1,643	: 678
1967-68	: 675	: 1,045	: 169	: 1,145	: 2,225	: 714
1968-69	: 690	: 1,594	: 183	: 995	: 1,977	: 787
1969-70	: 855	: 1,328	: 273	: 845	: 2,691	: 672
1970-71*	: 1,006	: 1,121	: 319	: 855	: 2,547	: 538

\* Estimated.



Chilean sodium nitrate, calcium nitrate, and calcium cyanamide formerly made up a large share of the imports, but they have been largely replaced by more concentrated materials, particularly anhydrous ammonia and urea.

In phosphates, the United States shifted back and forth from an import to an export balance of processed phosphatic fertilizers prior to 1941. Since 1941, however, an export balance has been maintained. It became more pronounced as AID requirements increased.  $P_2O_5$  exports peaked in 1967-68. The decrease in AID requirements beginning in 1969-70 has been partially offset by increased shipments of ammonium phosphates to Europe. The United States exports about twice as much processed  $P_2O_5$  as any other country. In addition, the United States has exported 10 to 12 million tons of phosphate rock annually for the last 4 years.

U.S. potash imports exceeded exports until 1941. From 1941 through 1949, exports were larger than imports. Imports again exceeded exports in 1950 and continued to do so through 1955-56. Exports exceeded imports from 1956-57 through 1961-62 when production from the newly developed Canadian deposits shifted the balance to imports. Imports of Canadian potassium chloride (KCl) in 1969-70 and 1970-71 were and will be larger than deliveries of domestic KCl for domestic use.

#### WORLD FERTILIZER MARKET

World interest in fertilizer has intensified as demonstrations have shown how the yield of crops can be increased through the use of fertilizer. Fertilizer is an important tool for increasing needed food production in the developing countries and for use by developed countries to produce surplus food, which can be shared with developing countries until agricultural production can be increased sufficiently to meet essential needs.

World consumption of primary plant nutrients totaled 60 million metric tons 1/ in 1968-69 -- 26.6 million metric tons of N, 17.5 million metric tons of  $P_2O_5$ , and 15.9 million metric tons of  $K_2O$  (tables 11, 12, and 13). The developed countries are the leading producers of the primary plant nutrients. But some of the developing countries rank in the top ten as consumers.

The United States used about 25 percent of total world consumption of primary plant nutrients in 1968-69. It ranked number one in total use of each of the plant nutrients and number one in production of N and  $P_2O_5$ .

Nitrogen -- In 1968-69, the United States produced 26 percent of the world's supply of N for fertilizer, consumed 25 percent, and ranked

1/ Multiply metric tons by 1.10230 to convert to short tons.

Table 11.-- Nitrogen: Production, consumption, and foreign trade by leading countries, 1968-69

Country	Production		Imports		Exports		Consumption	
	Metric tons N	Rank	Metric tons N	Rank	Metric tons N	Rank	Metric tons N	Rank
United States.....	6,778,000	1	627,000	2	1,104,000	1	6,198,616	1
U. S. S. R.....	3,750,000 1/	2	-----	-	195,400	10	3,454,000	2
Japan.....	2,107,000	3	10,000	-	916,000	2	907,000	7
West Germany.....	1,597,748	4	76,785	-	630,975	4	932,668	6
France.....	1,372,000 1/	5	103,658	-	220,376	9	1,243,125	3
Italy.....	1,088,460	6	11,031	-	486,549	5	514,260	10
Netherlands.....	954,119	7	12,947	-	670,711	3	339,200	-
United Kingdom.....	911,300	8	169,800	6	81,800	-	952,400	5
Poland.....	758,945	9	13,335 1/	-	67,014 1/	8	706,900 1/	8
Canada.....	700,000 1/	10	20,000 1/	-	264,000 1/	-	390,000 1/	-
India.....	563,000 1/	11	780,000 1/	1	-----	-	1,222,000 1/	-
Bulgaria.....	504,000 1/	12	20,000 1/	-	100,000	-	370,000	-
Spain.....	404,000	13	90,900	-	2	-	568,200	-
Rumania.....	420,714	14	1,800	-	32,000	-	330,000	-
Belgium.....	400,000 1/	15	92,000	-	402,000	6	170,246	-
Norway.....	373,700	16	-----	-	301,200	7	70,900	-
East Germany.....	351,429	17	156,675	8	45,000	-	510,700 1/	-
Cuba.....	25,000 1/	-	205,000 1/	3	-----	-	175,000 1/	-
Pakistan.....	135,000 1/	-	200,000 1/	4	16,000	-	319,000 1/	-
Denmark.....	62,345	-	172,082	5	-----	-	249,137	-
Turkey.....	34,534	-	160,560	7	-----	-	186,628	-
Indonesia.....	47,000 1/	-	151,200 1/	9	-----	-	198,200	-
Mexico.....	196,000 1/	-	151,000 1/	10	1,000	-	345,000 1/	-
World Total	26,580,000		5,180,000		6,160,000		24,520,000	

1/ Unofficial figure

Source: Fertilizers, an annual review of world production, consumption, trade and prices, 1969  
Food and Agriculture Organization of The United Nations.

Table 12.--- Phosphate: P<sub>2</sub>O<sub>5</sub> production, consumption, and foreign trade by leading countries, 1968-69

Country	Production		Imports		Exports		Consumption	
	Metric tons	Rank	Metric tons	Rank	Metric tons	Rank	Metric tons	Rank
United States....	4,552,000	1	165,000	3	902,000	1	4,168,787	1
U. S. S. R.....	1,934,000	2	-----	-	106,300	9	1,748,000	2
France.....	1,374,600 <sup>1/</sup>	3	320,275	1	98,479	-	1,587,357	3
West Germany.....	904,700 <sup>1/</sup>	4	98,100	7	190,500	4	781,001	5
Australia.....	851,736	5	7,000 <sup>1/</sup>	-	-----	-	890,000 <sup>1/</sup>	4
Japan.....	762,800	6	-----	-	34,700	-	697,000	6
Belgium.....	571,410	7	46,959	-	437,220	2	130,000	-
Italy.....	554,117	8	48,465	-	98,552	10	469,990	8
Canada.....	510,000 <sup>1/</sup>	9	40,000	-	170,000	5	380,000	11
Poland.....	474,413	10	21,684	-	-----	-	487,700	7
United Kingdom...	436,300	11	60,100	-	19,300	-	447,000	9
Spain.....	356,500	12	34,600	-	1,989	-	389,100	10
East Germany.....	345,827	13	40,970	-	-----	-	361,000	12
New Zealand.....	323,519	14	2,878	-	-----	-	323,604	13
Netherlands.....	273,292	15	63,353	11	246,394	3	103,925	-
Tunisia.....	183,190	-	-----	-	156,000	6	30,410	-
Luxembourg.....	139,671	-	1,360	-	121,077	7	6,729	-
Morocco.....	137,800 <sup>1/</sup>	-	4,100	-	107,400 <sup>1/</sup>	8	31,500	-
Turkey.....	-----	-	181,206	2	-----	-	181,691	-
Bulgaria.....	150,000	-	142,000	4	-----	-	292,000 <sup>1/</sup>	-
Cuba.....	3,000 <sup>1/</sup>	-	110,000	5	-----	-	113,000 <sup>1/</sup>	-
Brazil.....	109,397	-	104,676	6	-----	-	214,073	-
Chile.....	5,082	-	95,785	8	-----	-	100,700	-
India.....	213,000 <sup>1/</sup>	-	91,000 <sup>1/</sup>	9	-----	-	296,000 <sup>1/</sup>	-
Korea, Rep. of...	27,581	-	65,251	10	-----	-	121,361	-
World Total....	17,470,000		2,560,000		2,980,000		17,280,000	

<sup>1/</sup> Unofficial figure

Source: Fertilizers - an annual review of world production, consumption, trade and prices, 1969  
Food and Agriculture Organization of The United Nations.



Table 13.-- Potash: K<sub>2</sub>O production, consumption, and foreign trade by leading countries, 1968-69

Country	Production		Imports		Exports		Consumption	
	Metric tons	Rank	Metric tons	Rank	Metric tons	Rank	Metric tons	Rank
U. S. S. R.....	3,120,000	1	-----	-	716,100	5	2,210,000	2
Canada.....	2,990,300 <u>1/</u>	2	20,000	-	2,350,000	1	230,000	10
United States...	2,486,000	3	1,793,000	1	714,000	6	3,506,771	1
East Germany....	2,293,000	4	-----	-	1,500,000	2	650,000	7
West Germany....	2,188,066	5	79,246	-	1,234,416	3	1,045,887	4
France.....	1,721,000 <u>1/</u>	6	234,896	6	830,218	4	1,213,399	3
Spain.....	588,100	7	-----	-	166,248	8	110,200	-
Israel.....	344,305	8	-----	-	363,410	7	6,620	-
Italy.....	184,015	9	119,258	-	78,772	9	176,737	-
Chile.....	15,400	10	40,223	-	9,688	10	9,639	-
Poland.....	-----	-	812,428	2	-----	-	897,400 <u>1/</u>	5
Japan.....	-----	-	727,000	3	-----	-	696,000	6
United Kingdom..	-----	-	499,800	4	-----	-	484,500	8
Czechoslovakia..	-----	-	470,000 <u>1/</u>	5	-----	-	468,045	9
Netherlands.....	-----	-	229,552	7	973	-	125,098	-
Yugoslavia.....	-----	-	191,267	8	-----	-	121,592	-
Belgium.....	-----	-	170,000	9	-----	-	175,000	-
Denmark.....	-----	-	163,987	10	-----	-	180,677	-
World Total...	15,930,000		7,950,000		7,960,000 <u>1/</u>		14,710,000	

1/ Unofficial figure

Source: Fertilizers - an annual review of world production, consumption, trade and prices, 1969  
Food and Agriculture Organization of The United Nations.

first as an exporter and third as an importer (table 11). India ranked first as an importer and fourth as a consumer. Indonesia, Pakistan, and Turkey, also AID participants, were among the top ten importers. Japan, Netherlands, Belgium, and Norway each exported more than it used at home.

Phosphate -- The United States continued in 1968-69 as the leading producer, consumer, and exporter of  $P_2O_5$  (excluding phosphate rock) (table 12). Five countries (Brazil, Chile, India, Republic of Korea and Turkey), participating in AID agricultural programs, were among the top ten importers of  $P_2O_5$ . Belgium, Netherlands, Tunisia, Luxembourg, and Morocco each exported more  $P_2O_5$  than it used at home.

The United States also has a dominant position in phosphate rock. It produced about 42 percent of the world's supply in calendar 1969 and exported 30 percent of that produced.

Potash -- The United States ranked third as a producer but first as a user and first as an importer of  $K_2O$  in 1968-69 (table 13). It ranked sixth as an exporter, about 51 percent of it going to AID countries.

The U.S.S.R. was the leading producer and ranked fifth as an exporter. Canada, East Germany, West Germany, Spain, and Israel each exported more  $K_2O$  than it used at home.

References to current fertilizer data

\*\*\*

Nitrogen production

1. Current Industrial Reports, Inorganic Fertilizer Materials and Related Acids, Series M28B, Bureau of the Census.
2. Preliminary Report on U.S. Production of Selected Synthetic Organic Chemicals, S.O.C. Series C (a monthly report); and Synthetic Organic Chemicals - United States Production and Sales (an annual report), Chemical Division, U.S. Tariff Commission (for urea).
3. Coke and Coal Chemicals, Monthly Coke Report, Mineral Industry Surveys, Bureau of Mines.
4. The Fertilizer Index, The Fertilizer Institute, (nitrogen, phosphate, and potash).

Phosphate production

1. Current Industrial Reports, Inorganic Fertilizer Materials and Related Acids, Series M28B, Bureau of the Census.
2. Phosphate Rock, Mineral Market Reports, Mineral Industry Surveys, Bureau of Mines.

Potash production

1. Potash, Mineral Market Reports, Mineral Industry Surveys, Bureau of Mines.
2. Press releases, Potash Institute of North America, 1649 Tullie Circle, N.E., Atlanta, Georgia 30329

U.S. Foreign trade

1. U.S. Imports of Merchandise for Consumption, Report No. FT 135 and FT 246; U.S. Exports of Domestic and Foreign Merchandise, Report No. FT 410; Foreign Trade Division, Bureau of the Census.

U.S. fertilizer consumption

1. Annual fertilizer consumption reports, Statistical Reporting Service, U.S. Department of Agriculture.
2. Consumption of Liquid Commercial Fertilizers in the United States, Selected Years 1954-65, and subsequent annual reports, Statistical Reporting Service, U.S. Department of Agriculture.
3. Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States 1850-1964 and by States, 1945-64, Statistical Bulletin No. 375, Statistical Reporting Service, USDA, June 1966.

World production, consumption and trade

1. Fertilizers - an annual review of production, consumption, trade and prices, Food and Agriculture Organization of United Nations.
2. Nitrogen, The Magazine of World Nitrogen, and Phosphorus & Potassium, The British Sulphur Corporation, Ltd., 23 Upper Brook Street, London W1Y 2BB, England.

